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Manufacturing strategies and innovation performance in newly industrialised countries

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Abstract

Purpose – The purpose of this paper is to present a comparative study on the impact of manufacturing strategies and resources on innovation performance in two newly industrialised countries in the South East Asian region, Thailand and Vietnam.

Design/methodology/approach – A quantitative approach was employed. The survey data was drawn from 95 Thai and 44 Vietnamese middle or senior managers in manufacturing firms.

Findings – Three major findings were noted in this study. First, there were no significant differences between Thai and Vietnamese manufacturing firms with respect to manufacturing strategies, resources, and innovation performance. Second, differentiation strategy is shown to be the strongest predictors for both product and process innovation across both countries. Technology management, however, only shows a significant effect on both product and process innovation among Thai firms. The other three manufacturing strategies (leadership, people management, and R&D) did not show a significant relationship with any of product or process innovations. Finally, the results of the moderating regression analysis, using country as a dummy variable, confirm that the effect of technology on product innovation is significantly stronger among Thai firms than Vietnamese firms.

Research limitations/implications – Small sample sizes of both countries are the major limitation of the study. Future studies can advance this research by incorporating a larger sample size as well as focusing on more innovative industries, such as electronics, automotive and food industries.

Practical implications – The results provide insights on the status of several key managerial practices among manufacturing firms in Thailand and Vietnam. The study highlights the lack of R&D intensity in manufacturing firms as well as its non-significant impact on innovation performance.

Originality/value – This is the first empirical study to compare two newly industrialised countries in the South East Asian region in regards to manufacturing/operational practices, innovation performances, and differentiation strategy.

Keywords Innovation, Strategic manufacturing, Newly industrialized economies, Thailand, Vietnam

Paper type Research paper

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Introduction and literature review

In both industrialized countries (e.g. the USA, the UK, Germany) and newly industrialized countries (e.g. China, Thailand, Vietnam, Malaysia), manufacturing firms are facing significant change resulting from mass customization, shortening product life cycles, increasing technological change, and the entry of international competitors into their markets. The market for products and services is becoming increasingly international, as has been witnessed by the automotive and electronics industries. In responding to the international markets or globalization, firms realize that they need to adopt more international manufacturing/operational strategies while at the same time ensuring that the organizational culture is appropriately adapted at the local level to ensure that expected benefits from implementing those strategies are achieved. Globalization has had a major impact on manufacturing, both locally and internationally. With globalization broadening the marketplace and increasing competition, customers are placing greater demands on manufacturers to increase quality, serviceability, and flexibility while maintaining competitive costs (Dangayach and Deshmukh, 2003; Laosirihongthong and Dangayach, 2005b).

With regards to competitive priorities, Hill (2000) identified various order qualifiers and order winners. Order qualifiers are those criteria a company must meet to be considered as supplier. Order winners are those criteria that win the order over the competition. In other words, to provide order qualifiers, firms need only to be as good as competitors but to provide order winners they must be superior to. When developing order winners and order qualifiers, firms must distinguish each market place by their level of their importance. As market conditions have changed, so has the basis of competition. For example, quality is now being considered more as an order qualifier whereas other competitive dimensions such as flexibility, responsiveness, and particularly innovation, are now being considered as order winners (Bolwijn and Kumpe, 1990; Hamel and Prahalad, 1994).

A number of empirical studies that focused broadly on specific manufacturing strategies for newly industrialized countries such as Hungary (Chikan and Demeter, 1995), Brazil (Rohr and Corra, 1998), UAE (Badri *et al.*, 2000), and Ghana (Amoako-Gyampah and Boye, 2001) have been reported in the literature. Studies focusing on innovation as an order-winner are limited, however, especially for newly industrialized countries. As noted earlier, innovation has become a strong competitive strategy to achieve world-class manufacturing status and compete effectively in global markets (Laosirihongthong and Dangayach, 2005a).

The purpose of this study is to present a comparative empirical study on manufacturing strategies and innovation performance in two newly industrialized countries, namely Thailand and Vietnam. These two countries tend to focus on taking advantage of lower labour costs in order to give their product competitive advantage over their competitor's products from industrialized countries. This is fairly typical of developing countries when migrating from traditional type of industries to more advanced manufacturing industries (as in the case of both). As has been demonstrated by the rise of wages in countries such as Malaysia and South Korea, the labour cost advantage could be short-lived. Hence, it is important to search for alternative sources of competitive advantage (Jin, 2004; Nguyen *et al.*, 2004). Innovation would provide these newly industrialized countries (Thailand and Vietnam) with

opportunities to match the competitive status owned by the developed countries in the region, most notably Japan and Korea (Herbig and Palumbo, 1996).

The manufacturing industry in Thailand has become one of the most important sectors in Thailand economics, contributing substantially to employment and GDP. The dominant sector of economic activity in 2000 was non-agricultural, accounting for 88.8 per cent of GDP and 43.32 per cent of employment (Bank of Thailand, 2002). However, the growth rate of manufacturing production index increased from 1.4 per cent in 2001 to 7.7 per cent in 2002 (FTI, 2003). The three manufacturing sectors (textiles and apparel, food, and automobiles) accounted for 40.11 per cent of GDP and 31.02 per cent of employment. Much of this strong performance has been driven by intensive foreign direct investment (FDI) during the past ten years (Bank of Thailand, 2004). The same situation is evident in Vietnam. The most recent government policy reflects a direction towards being fully integrated into the global economy, internationally competitive, which characterises an industrialized and knowledge-based society, within 20 years (UNDB, 2004). In addition, the policy requires a doubling of the GDP by 2010, which places more emphasis on manufacturing industry over agricultural sectors (Hsieh *et al.*, 2004).

The major aim of our study is to examine the importance of manufacturing strategies on innovation performance in the manufacturing industries of Thailand and Vietnam. The paper consists of seven sections. The next section describes research framework using in this study, which leads to establish three research questions. Research methodology, data analysis and key findings, and discussion of findings are explained in one after the other, respectively. The penultimate section summarizes the implications of the research findings at three levels: national, industry and firm. The conclusions and limitations of the study are described in the last section.

Research framework

In order to compare the two countries in terms of their manufacturing strategies, resources and innovation, this study developed a research framework, which comprised five determinants of innovation and two measures of innovation performance. The first two determinants represent the infrastructure of an organization, which include leadership and people management. The next two determinants denote innovative capabilities, which are represented by technology management and R&D management. The fifth determinant is business strategy, which determines the direction of the area of performance organizations pursue. The role of these five variables in determining innovation performance has been recognised from both theoretical and empirical perspectives in the literature. For example, leadership and people management are instrumental in developing organizational learning, which will impact on innovation performance (Aranda and Molina-Fernández, 2002; García-Morales *et al.*, 2006; Rickards and Moger, 2006). The role of technology management and R&D as organisational capability for innovation has been a major point noted in the literature (Lin *et al.*, 2002; Prajogo and Sohal, 2006). Finally, organizational strategy has been long recognized as one of the key drivers of innovation (Cozzarin and Percival, 2006; Souitaris, 2001). These five variables were considered as the predictors of two major areas of innovation performance, product and process. Figure 1 shows the research framework.

In articulating the link between the research framework and the objectives of this study, three research questions were posed as follows:

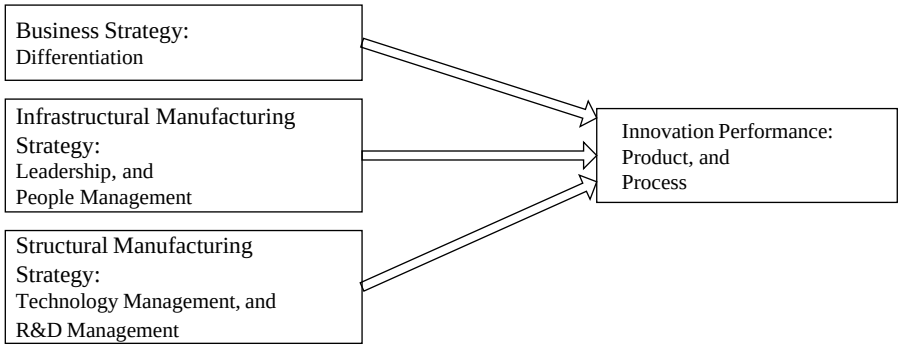

Figure 1.
Research framework

RQ1. Do the scales used in this study show a similar degree of validity and reliability in Thailand and Vietnam?

RQ2. Are there any differences between the two countries with respect to their manufacturing strategies and innovation performance?

RQ3. Are there any differences in the predictive power of manufacturing strategies on innovation performance between the two countries?

Research methods

Survey instrument

In this study, we used pre-tested constructs from past empirical studies to ensure their validity and reliability, following the suggestion made by Tata *et al.* (1999). The scales used in this study were used in an earlier study by Prajogo and Sohal (2006). The content and rationale of the scales is briefly described below.

The leadership scale included the creation of unity of purpose, encouragement of change, management of the environment, and use of employees' ideas in improving the business. Therefore, the scale delineates the practices of leadership rather than personal characteristics of the firms' leaders, which have been commonly examined in innovation studies (Miller and Toulouse, 1986; Howell and Higgins, 1990; Lefebvre and Lefebvre, 1992; Papadakis and Bourantas, 1998). For people management, the scale focused on training, development, communication, safety, multi-skilling, employee flexibility, employee responsibility and measurement of employee satisfaction. Both the leadership and people management scales are based on surrogate Malcolm Baldrige National Quality Award criteria used by Samson and Terziovski (1999).

For technology management strategy, the scale was adapted from the study by Morita and Flynn (1997). The content captures several key aspects of strategic technology direction, anticipation of new technology and a long-term commitment for developing technological capabilities. These elements not only reflect current technology status, but also the firm's commitment to explore and, to a certain degree, forecast, future technology development, which is strongly connected with innovative behaviour (Lemos and Porto, 1998; Small, 2006).

The scale measuring R&D management strategy was derived from the works of Chiesa *et al.* (1996) and Gupta *et al.* (2000). The content includes the capability to handle truly innovative and leading edge research, the level of risk and return involved in the

R&D projects, and the extent of integration between R&D with business strategy as well as with other departments within the firms.

Since, this study is focused on innovation, differentiation strategy was selected to represent the business strategy of the organizations, following Porter's (1980) concepts of generic strategies. In developing a measure for business strategy, the scale developed by Miller (1988) was adopted. The scale of differentiation strategy incorporates three items assessing the use of major and frequent product innovations, the tendency to beat competitors in the marketplace, and the degree of innovative orientation of the company.

The scales for measuring innovation performance were derived from several criteria which have been conceptualized and used in previous empirical studies of innovation, such as Miller and Friesen (1982), Deshpande *et al.* (1993), Avlonitis *et al.*(1994), and Subramanian and Nilakanta (1996). These criteria are the number of innovations, the speed of innovation, the level of innovativeness (novelty or newness of the technological aspect), and being the "first" in the market. These four characteristics of innovation were then contextualized into two major areas of innovation, namely product innovation and process innovation. Conceptually, product innovation is concerned with generating new ideas or the creation of something entirely new that is reflected in changes in the end product or service offered by the organization. Process innovation represents changes in the way firms produce end products or services through the diffusion or adoption of an innovation developed elsewhere (Tidd *et al.*, 1997; Zhuang *et al.*, 1999). Perceptual data were used in which respondents were asked to evaluate the company's innovation performance against the major competitor in the industry. This approach, as affirmed by Kraft (1990), was used to minimize the possibility of bias from subjective answers.

All items in the seven constructs used five-point Likert scale. The scales of leadership, people management, technology, R&D, and differentiation ranged from strongly disagree (1) to strongly agree (5). The scales for product and process innovation ranged from worst in industry (1) to best in industry (5). A complete list of the items used in this study is presented in Table I.

Source of empirical data

The sample chosen for this study were from manufacturing industry. The reason for this was that the manufacturing industry in these countries is heterogeneous in terms of sub-sectors and product/process complexity. The major industry in Thailand is automobile parts and components, electronics, textiles, and foods, while the major industries in Vietnam are telecommunication, automobile parts and components, and construction.

In Thailand, 170 questionnaires were sent to participants of public training courses (at least two-days course), which were organized by the Technology Promotion Association (Thai-Japan). The Technology Promotion Association was recognized as the largest training organization in the country. These courses were mainly focused on manufacturing strategy and operational excellence including total quality management, logistics and supply chain management, small group activities, human resources management, statistical process control, and continuous improvement. The participants held middle management positions or above in various manufacturing firms such as automotive, electronics parts and components, foods, and textile. A total of 95 questionnaires were completed and returned, constituting a 55.9 per cent response rate.

Table I.
Scale validity and reliability

Scales	Items	Thailand ($N = 95$) Factor loadings	Thailand ($N = 95$) Cronbach's a α	Vietnam ($N = 44$) Factor loadings	Vietnam ($N = 44$) Cronbach's α
Leadership	Senior executives share similar beliefs about the future direction of this company	0.86	0.81	0.75	0.67
	Senior managers actively encourage change and implement a culture of improvement and learning	0.85		0.64	
	Employees have the opportunity to share in and are encouraged to help the company implement change	0.80		0.71	
	There is a high degree of unity of purpose and we have eliminated barriers between departments	0.69		0.76	
People Management	We have a company-wide training and development process for all our employees	0.86	0.82	0.79	0.78
	Our company has maintained both "top-down" and "bottom-up" communication processes	0.79		0.55	
	Employee satisfaction is formally and regularly measured	0.76		0.85	
	Employee flexibility, multi-skilling and training are actively used to support performance improvement	0.71		0.78	
	We maintain a work environment that contributes to the health, safety and well-being of all employees	0.68		0.67	
Technology Management	Our company always attempts to stay on the leading edge of new technology in our industry	0.93	0.91	0.91	0.88
	We make an effort to anticipate the full potential of new practices and technologies	0.90		0.91	
	We pursue long-range programmes in order to acquire technological capabilities in advance of our needs	0.89		0.90	
	We are constantly thinking of the next generation of technology	0.83		0.90	
Research and Development	We have excellent communication processes between R&D and other departments	0.90	0.88	0.92	0.93
	Our R&D pursues truly innovative and leading-edge research	0.86		0.92	

(*continued*)

Table I.

Scales	Items	Thailand ($N = 95$) Factor loadings	Thailand ($N = 95$) Cronbach's a α	Vietnam ($N = 44$) Factor loadings	Vietnam ($N = 44$) Cronbach's α
Differentiation	Our R&D strategy is mainly characterised by high risk projects with chance of high return	0.86	0.85	0.91	0.75
	R&D plays a major part in our business strategy	0.84		0.88	
	Development and introduction of major and frequent product innovations is our primary strategy	0.89		0.92	
	Our company always attempts to be ahead of competitors in product novelty or speed of innovation	0.88		0.88	
	We are growth-, innovation-, and development-oriented rather than favouring the tried and true market	0.87		0.62	
Product Innovation	The level of newness (novelty) of our firm's new products	0.92	0.94	0.90	0.92
	The use of latest technological innovations in our new products	0.91		0.79	
	The speed of our new product development	0.90		0.88	
	The number of new products our firm has introduced to the market	0.89		0.88	
	The number of our new products that is first-to-market (early market entrants)	0.89		0.89	
Process Innovation	The technological competitiveness of our company	0.93	0.93	0.90	0.88
	The speed with which we adopt the latest technological innovations in our processes	0.92		0.88	
	The updatedness or novelty of the technology used in our processes	0.89		0.83	
	The rate of change in our processes, techniques and technology	0.88		0.82	

In Vietnam, the questionnaires were sent to 75 of the 84 students enrolled in the international executive MBA programs run by the Asian Institute of Technology in Hanoi and Ho Chi Min City. These students were also manufacturing practitioners and had had several years of working (i.e. managerial) experience in the manufacturing industry. Several students also had work experience with firms enlisted in Fortune 500 (2005), such as Exxon Mobile, Ford and Toyota. A total of 44 completed responses were received, leading to 58.7 per cent response rate. Table II presents the key characteristics of respondents involved in this study.

The sizes of the firms included in the sample are mostly medium to large (100 employees or more). The positions of the respondents in the company are, as noted above, in the middle or senior level of management. This is important for ensuring the accuracy of the information they provided in this study, which is concerned, with strategic aspects of the company. This is coupled with the adequate work experience of the respondents, which was more than three years.

Data analysis and key findings

Scale validity and reliability tests

Validity and reliability tests were performed for the seven constructs used in this study, following the method employed in the studies of Flynn *et al.* (1994), Samson and Terziovski (1999), and Meyer and Collier (2001). The seven constructs were subjected to principal component analysis with varimax rotation to examine their unidimensionality. The results (Table I) support the validity of these constructs for both countries as indicated by the loading factors of all items within each scale exceeding 0.5 (Hair *et al.*, 1998).

The reliability analysis was conducted by calculating the Cronbach α for each scale. The results in Table I show that the Cronbach's α for the seven constructs passed the threshold point of 0.6, suggested by Nunnally (1978). Therefore, in response to the *RQ1*, our findings indicate that there is a convergence in manufacturing

	Thailand (N=95)		Vietnam (N=44)	
Number of employees	Frequency	Percentage	Frequency	Percentage
Less than 100	18	19	11	25
101-500	30	32	18	41
501-1,000	21	22	2	5
1,001 or more	26	27	13	30
Position in the company				
CEO/general manager/president/factory manager	3	3	4	9
Divisional manager/production/QA/logistics	19	20	17	39
Assistant manager/engineers/technical	44	46	23	52
Leaders/supervisors	29	31	0	0
Years of experience				
$<$3 years	5	5	4	9
3-5 years	22	23	17	39
5-10 years	37	39	23	52
10-15 years	26	27	0	0
$>$15 years	5	5	4	9

Table II. Characteristics of respondent

strategies and innovation performance in both Thai and Vietnamese manufacturing firms.

The composite scores for the seven constructs were calculated from the mean values of the respective items within the scales. The use of mean values is important in assessing the difference between the two countries with respect to the seven measures incorporated in this study as presented in the next section.

T-*test*

An independent *t*-test was conducted to investigate *RQ2*, that is, whether there are differences in the manufacturing strategies and innovation performance between Thai and Vietnamese firms. As presented in Table III, results indicate that there are no significant differences between Thai firms and Vietnamese firms with respect to the seven constructs.

R&D showed the lowest score among the five determinants of innovation, which scored between 3.30 and 3.70. This is coupled with the low scores of both product and process innovation in the two countries. This indicates that the firms in both countries have not strongly considered innovation as one of their strategic competencies.

Bivariate correlations

Bivariate correlations and multiple regression analysis (MRA) were employed to address *RQ3*, which is concerned with the predictive power of manufacturing strategies on innovation performance. Table IV presents the Pearson correlations among the seven variables with the dataset being split between the two countries. Most correlations are significant at $p < 0.01$ and $p < 0.05$.

In particular, this study focused on the correlations between the five strategies and the two performance measures. Differentiation showed the strongest correlation with innovation performance, followed by technology and R&D, whilst leadership and people management showed relatively low correlations. These results were consistent between the two countries, and this indicates that structural resources played a more significant role in determining innovation performance than do infrastructural resources.

Multiple regression analysis

MRA was run separately between Thai and Vietnamese firms by treating five variables (leadership, people, technology, R&D, and differentiation) as predictors

Table III.
Mean scores and *t*-test between Thailand and Vietnam

Scales	Thailand ($N = 95$) Mean	Thailand ($N = 95$) Std. Dev.	Vietnam ($N = 44$) Mean	Vietnam ($N = 44$) Std. Dev.	Δ Mean Thai-Viet	*p*-value
Leadership	3.55	0.79	3.73	0.62	−0.18	0.18
People management	3.49	0.79	3.30	0.70	0.19	0.17
Technology management	3.49	0.89	3.62	0.98	−0.12	0.46
R&D management	2.76	0.97	2.78	1.13	−0.03	0.89
Differentiation strategy	3.25	0.95	3.41	0.81	−0.16	0.35
Product innovation	3.02	0.98	2.95	0.87	0.07	0.69
Process innovation	3.13	0.91	3.20	0.72	−0.07	0.65

		V1	V2	V3	V4	V5	V6	V7
Thailand	Leadership (V1)	1.00						
	People (V2)	0.62**	1.00					
	Technology (V3)	0.37**	0.58**	1.00				
	R&D (V4)	0.48**	0.35**	0.45**	1.00			
	Differentiation (V 5)	0.38**	0.30**	0.47**	0.52**	1.00		
	Product Innovation (V6)	0.30**	0.23*	0.44**	0.36**	0.64**	1.00	
	Process Innovation (V7)	0.22*	0.34**	0.47**	0.24*	0.47**	0.62**	1.00
Vietnam	Leadership (V1)	1.00						
	People (V2)	0.65**	1.00					
	Technology (V3)	0.41**	0.39**	1.00				
	R&D (V4)	0.57**	0.62**	0.64**	1.00			
	Differentiation (V5)	0.53**	0.45**	0.64**	0.44**	1.00		
	Product Innovation (V6)	0.53**	0.51**	0.27	0.48**	0.54**	1.00	
	Process Innovation (V7)	0.24	0.21	0.52**	0.34*	0.60**	0.51**	1.00

Notes: $^{*}p < 0.05$, $^{**}p < 0.01$

Table IV.
Correlations analysis

(independent variables) and two variables (product innovation and process innovation) as indicators of performance (dependent variables). As presented in Table V, the five predictors show a larger explanatory power against product innovation than process innovation as indicated by the R^2 values.

The results of MRA in Table V also show that differentiation strategy is the strongest predictor of both product and process innovation across both countries. Technology also shows a significant effect on both product and process innovation among Thai firms. This, however, is not replicated in the case of Vietnam. The negative effect of technology on product innovation indicates a suppression effect, which is caused by multicollinearity (strong correlations) between technology, R&D, and differentiation (Table IV). This point is noteworthy to prevent misinterpretation of the findings, which appear to indicate that technology has a negative impact on innovation, hence, contradicting the result of bivariate correlation.

		Product innovation		Process innovation	
Country	Predictors	Unstandard B	*p*-value	Unstandard B	*p*-value
Thailand	Leadership	0.11	0.43	−0.09	0.51
	People management	−0.14	0.34	0.18	0.23
	Technology management	0.26	0.04	0.28	0.03
	R&D management	−0.03	0.74	−0.08	0.43
	Differentiation strategy	0.57	0.00	0.36	0.00
	Adjusted R^2	0.42		0.28	
Vietnam	Leadership	0.19	0.42	−0.15	0.49
	People management	0.16	0.46	−0.10	0.59
	Technology management	−0.34	0.04	0.14	0.33
	R&D management	0.27	0.07	0.07	0.57
	Differentiation strategy	0.53	0.01	0.48	0.01
	Adjusted R^2	0.40		0.33	

Table V.
Multiple regression analysis

Having identified few differences in the effect of the predictors on performance between the two countries; we ran a moderating regression analysis to confirm that the country has a significant effect on the relationship between predictors and performance. To perform this analysis, the data set was accumulated with a variable country being created as a dummy variable (Vietnam = 0 and Thailand = 1). Prior to moderated regression analysis, all variables were standardised to avoid multicollinearity between the independent variables and their product term (the independent variable × country). This method has been suggested by Tabachnick and Fidell (2001).

The result of the moderated regression analysis is presented in Table VI with the focus placed on the effect of the product terms on performance. The results indicate that there is a significant interaction between technology and country in determining product innovation performance. The positive standardized *B*-value suggests that the effect of technology on product innovation is stronger among Thai firms than Vietnamese firms. This confirms the MRA results in Table V. On the other hand, the similar interaction has no effect on process innovation although the result in Table V suggests that technology has a stronger effect on process innovation among Thai firms than on Vietnamese firms. Therefore, in relation to *RQ3*, the difference between the two countries is only significant in the effect of technology strategy on product innovation.

Discussion of the findings

Several implications for industrial practitioners can be identified. First, the relatively low score of R&D indicates the firms in both countries hold reservations about investing in more truly innovative projects. This finding could be because most of the manufacturing industries in both countries have been dominated by FDI as explained earlier. These foreign firms mainly focus on manufacturing (i.e. production) activities and prefer to keep their R&D activities in their home country. In the light of technology transfer theory (Harris and Harris, 2004), these FDIs may only be prepared to transfer object-embodies (hardware, automation systems, computer-based control technology), methods-embody (total quality management, supply chain management, just-in-time production system), and person-embody (hiring experts and technician to support the manufacturing process control). On the other hand, record-embodies (design information, engineering data, blueprint) are transferred on a very limited basis for several competitive reasons. This notion may be linked to the

	Product innovation			Process innovation		
	Unstd B	Std. error	*p*-value	Unstd B	Std. error	*p*-value
Leadership	0.10	0.10	0.29	−0.10	0.11	0.37
People	−0.03	0.10	0.72	0.08	0.11	0.44
Technology	0.06	0.09	0.52	0.25	0.10	0.02
R&D management	0.07	0.09	0.43	−0.04	0.10	0.68
Differentiation	0.54	0.09	0.00	0.42	0.10	0.00
Country (dummy variable)	0.08	0.07	0.27	0.00	0.08	1.00
Leadership × country	−0.03	0.11	0.81	0.02	0.12	0.86
People × country	−0.11	0.10	0.27	0.12	0.11	0.29
Technology × country	0.28	0.10	0.00	0.07	0.11	0.52
R&D × country	−0.15	0.09	0.11	−0.09	0.10	0.40
Differentiation × country	−0.01	0.10	0.95	−0.06	0.11	0.58

Table VI.
MRA with country as a moderating variable

fact that mean firms in newly industrialized countries still harvest from low cost advantage in their operations over their competitors in developed countries rather than investing in innovative products and technologies.

Second, the low level of R&D implementation was confirmed by its non-significant effect on innovation performance. Compared to other similar studies in industrialised countries, such as Australia (Prajogo and Sohal, 2006) and Europe (Avermaete *et al.*, 2003), the effectiveness of technology and R&D management in determining innovation performance in these two NICs was significantly lower. This suggests that Thailand and Vietnam managers need to examine the level of their firm's technology and R&D and their effectiveness in producing innovative results. The low effect of technology and R&D was consistent with that of leadership and people management. Despite their relatively high scores, these two strategies did not produce high innovation performance. This suggests that leadership and people management skills in Thailand and Vietnam must be appropriately designed. On the other hand, differentiation strategy was shown to be the strongest predictor of innovation performance. This situation is puzzling because as a business strategy, differentiation needs to be deployed into manufacturing strategies as resources to achieve the intended performance. However, this finding suggests that differentiation strategy was channelled through other resources before it resulted in innovation performance.

Third, the result of this study shows that cost orientation is still being considered as the order-winner for both countries rather than product and process innovation. This finding could be explained by the fact that most of firms in both countries have been dominated by multinational companies that have been using offshore manufacturing as their business strategy in order to reduce local manufacturing costs. As explained earlier, these foreign firms mainly focus on manufacturing (i.e. production) activities and prefer to keep the R&D activities in their home country. However, cost orientation is becoming an order qualifier for many industrialized countries (i.e. Japan, Korea, Singapore, and Australia). To provide order qualifiers, firms need only to be as good as their competitors (Thailand, Vietnam, China, and Malaysia). To provide order winners, innovation for example, managers need to consider how their company could perform better than their competitors and recognize the level of importance for individual criteria applicable different markets.

Fourth, when innovation is considered as an order winner, the results of this study indicate that the degree of R&D implementation and product and process innovation in both countries are still low. Previous studies (Avermaete *et al.*, 2003; Huang and Lin, 2006) indicate that in order to increase innovation performance, R&D is one of the most important strategies. Managers need to consider R&D as a key competitor in business strategy and provide timely and adequate resources such as formal R&D expenditure, improved technological capability, adequate time and resources for employees to generate, share/exchange ideas, and experiment innovative ideas/solutions. In addition, appropriate mechanisms for ensuring R&D capability is developed locally would be to carry out R&D collaboratively with headquarters, limiting the number of experts sourced from overseas, and promoting a licensing agreement.

Finally, the significant role of differentiation strategy in predicting innovation performance confirms Porter's (1985) concept of competitive strategies. However, the

relatively low impact of technology and R&D on innovation indicated that differentiation strategy has not been effectively channelled through these commonly associated resources. This raises a question on the alignment between firm's strategy and resources.

Implications of the findings

Based on the above findings, we make the following recommendations for manufacturing stakeholders, namely government, industry associations, and firms. For government, we suggest that it develop and implement incentive schemes that encourage firms to make significant investments in R&D and technology development. This will have a significant effect on firms' performance, and in turn, enhance the competitiveness of the nation (Porter, 1998). In addition, governments must support tertiary education institutions to increase the knowledge and learning capacities of human ware in their curriculum (Hegde, 2005). Knowledge and learning have been shown as being instrumental in determining innovative capabilities at the individual level, which will affect the firm level (Ju *et al.*, 2006; Zhang *et al.*, 2004). In conjunction with this point, government also needs to facilitate the link between industry and university in developing innovation projects (Marques *et al.*, 2006).

For industry associations, it is important to play their roles in lobbying government to direct its policies, which supports innovation in various industry sectors (Spencer *et al.*, 2005). Industry associations also need to raise the awareness of the value of R&D investment among firms and provide knowledge sharing/exchange through a range of avenues, such as seminars and conferences.

At the firm level, there is a need for identifying and establishing "innovation champion(s)" that will develop initiatives and provide leadership in innovative projects. Senior management needs to consider innovation more seriously as a long-term strategy for the firm's survival and growth in dealing with dynamic markets (Lee and Tsai, 2005). Finally, management needs to lead the cultural change processes in the firms to be more learning and innovative-oriented, for example, through training programs.

Conclusions and limitations of the study

This study has identified three major findings. The first is the relatively equal level development in terms of the implementation of manufacturing strategies and innovation performance in manufacturing firms in Thailand and Vietnam. Second, the effect of individual elements of manufacturing strategies on innovation performance is also relatively equal between the two countries. Third, differentiation strategy and technology management are shown to be the significant predictors of innovation performance, whilst R&D management has no significant impact on innovation. By and large, the findings have indicated the need for enhancing the awareness and effectiveness of innovation management practices in both countries. Specifically, the findings also call for improvement in human knowledge and capabilities in dealing with innovation.

The limitation of this study is mainly concerned with the small sample size, particularly from Vietnam. However, looking at the fact that very few studies have given attention to Vietnam, the findings of this study provide some useful information concerning the status of manufacturing industries in this country compared to its

counterparts in the region. Given its strong development in manufacturing sectors, further studies on the strategies and performance of manufacturing firms in Vietnam are recommended.

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